Spatial Reasoning Toolkit

Shape properties

Birth to 7 years

Children are learning to:
Explore differently shaped objects and their properties through seeing and feeling/mouthing.

0-6 months

Children are learning to:
Show an interest in objects which are the same in contrasting sizes e.g. selecting a big spade or a small spade.

6-12 months

Children are learning to:
Respond to changes of shape e.g. flattening mud pies.

6-12 months

Children are learning to:
Attempt to fit shapes into spaces on inset boards, sometimes successfully.

6-12 months

Children are learning to:
Show an interest in shape and size, sometimes responding to words or gestures for '*big*' and '*small*', '*round*', or '*flat*'.

1 to 2 years

Children are learning to:
Attempt to fit shapes into spaces, beginning to select a shape for a specific space.

1 to 2 years

Children are learning to:
Respond to differences between shapes and sizes, and associated informal language as well as gestures.

2-year-olds

Children are learning to:
Recognise that two objects have the same shape e.g. child chooses two circles for eyes.

2-year-olds

Children are learning to:
Show awareness of differences between shapes, including selecting items by their shape and size so they are appropriate (e.g. chooses a triangular block for a roof).

3-year-olds

Children are learning to:
Respond to shape language (e.g. *straight*, *round*, *slanting*, *pointy*), and shape names (e.g. *circle*, *triangle*).

3-year-olds

Children are learning to:
Move and rotate shapes to fit the space or create the shape they would like.

3-year-olds

Adults could:
Provide malleable materials where children can change the shape (e.g. dough) and the size (e.g. enlarging a puddle) and talk about these changes.

Spatial Language:
'more' 'fill it up', 'long'

6-12 months

Adults could:
Provide similar shaped objects in assorted sizes (e.g. boxes or cups) and point out size differences in picture books (e.g. a big truck, little truck).

Spatial Language:
'same' and 'bigger'

6-12 months

Adults could:
Provide interestingly shaped objects (e.g. in treasure baskets) and encourage babies to explore shape characteristics (e.g. by rolling a ball to them.)

Spatial Language:
'round' and 'pointy'

0-6 months

This keyring includes typical spatial reasoning development and how adults can support this.

Please note:
- Ages are approximate
- Each child develops differently and at their own rate
- Ages are a guide and not expectations
- The stages build so earlier spatial learning continues to develop alongside new learning.

Adults could:
Provide blocks of different sizes and when building, talk about the choice of blocks, referring to specific shape properties.

Spatial Language:
'flat', 'round', 'giant' and 'teeny'

2-year-olds

Adults could:
Provide similarly shaped objects that can nest inside each other (e.g. pots, boxes, baskets, inset boards) as well as jigsaw puzzles with a small number of pieces.

Spatial Language:
'inside', 'fits' and 'larger'

1 to 2 years

Adults could:
Talk about the properties of shapes when fitting objects into spaces, e.g. "*these corners won't fit, we need a round shape.*"

Spatial Language:
'flat,' 'round' and 'bumpy'

1 to 2 years

Adults could:
Provide shape sorters and inset puzzles to fit shapes into.

Demonstrate putting small items inside larger versions (e.g. small bowl inside a large bowl).

Spatial Language:
'inside', 'bigger/smaller' and 'fits'

6-12 months

Adults could:
Provide jigsaws and train tracks for turning and flipping shapes and checking fit.

Spatial Language:
'turn over', 'around' 'bottom' and 'top'

3-year-olds

Adults could:
Talk about 'nearly' shapes (e.g. '*This is like a square, but it has curved corners*').

Model selecting shapes for a purpose (e.g. "*What will we use for the elephant's trunk?*").

Spatial Language:
'straight' and 'round'

3-year-olds

Adults could:
Provide a range of resources, e.g. recycled boxes, pattern blocks.

Offer an appropriate/inappropriate shape for their purpose, to investigate children's thinking.

Spatial Language:
'slanting', 'pointy' and 'too large/small'

3-year-olds

Adults could:
Make pictures together using shapes. Demonstrate comparing two objects to see if they have the same shape (e.g. two blocks or collage pieces).

Spatial Language:
'flat', 'round', 'giant' and 'teeny'

2-year-olds

Children are learning to:

Understand and use mathematical terms to describe shapes (e.g. *cylinder*) and properties as well as informal language and analogies (e.g. slanty, wiggly, box or roof-shaped).

4- and 5-year-olds

Children are learning to:

Identify several examples of the same shape (e.g. different triangles) and be able to visualise that a shape is the same even in different orientations.

4- and 5-year-olds

Children are learning to:

Use mathematical terms to describe regular and irregular shapes (e.g. *cuboid, prism, pyramid, hexagon, octagon*). Describe shapes using mathematical terms for properties.

6- and 7-year-olds

Children are learning to:

Visualise transformations using reflection and rotation to predict how shapes will look.

6- and 7-year-olds

For children's book ideas related to shape properties visit

www.earlymaths.org/ spatial-books

Birth to 7 years

The following print instructions are based on HP printers. Refer to your printer's handbook for more detailed instructions.

Print on both sides of the paper (Windows)

1. Open the document, and then click File > Print.

2. Select your printer, and then click Printer Properties, Preferences, or Printer Setup.

3. From the print settings, select the option for a two-sided print job. Menu options vary by printer model.

Click the Layout, Features, or Finishing tab. Click the Print on Both Sides drop-down menu, and then select Flip on Long Edge for a book or Flip on Short Edge for a tablet .

Click the Printing Shortcut tab, and then select the Two-sided (Duplex) Printing shortcut. Click the Print on Both Sides Manually drop-down menu, and then select Flip on Long Edge for a book or Flip on Short Edge for a tablet .

4. Click OK, and then click Print.

5. If the printer does not automatically print the other side, remove any remaining paper from the input tray to prevent issues.

6. Remove the printed pages from the output tray, and then reload them into the input tray.

For bottom-loading input trays, load the pages print-side up with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

For top-loading input trays, load the pages print-side down with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

7. Click Continue to complete the two-sided print job.

Print on both sides of the paper (macOS)

1. Open the document, and then click File > Print.

2. Select your printer, and then click Show Details if the button displays.

3. From the print settings, look for a Double-sided or Two-sided print option. If the neither option is available, continue with these steps to print manually on both sides of the paper.

Click Double-sided, and then select On for a book (long-edge binding) or On (Short Edge) for a tablet . Click Print. You are done.

Select Two-sided, and then open Layout from the print options menu. Select Long-Edge binding for a book or Short-Edge binding for a tablet . Click Print. You are done.

4. If the Two-sided or Double-sided options are not available, select Paper Handling from the print options menu.

5. Select Odd Only from the Sheets to Print or Pages to Print drop-down menu.

6. From the Sheet Order or Page Order drop-down menu, select Reverse (for bottom-loading input trays) or Automatic (for top-loading input trays), and then click Print.

7. After the pages are done printing, remove any remaining paper from the input tray to prevent issues.

8. Remove the printed pages from the output tray, and then reload them into the input tray.

For bottom-loading input trays, load the pages print-side up with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

For top-loading input trays, load the pages print-side down with the top edge towards the printer (book) or bottom edge towards the printer (tablet).

9. From the software, change the page settings for the second side.

From the Sheets to Print or Pages to Print drop-down menu, select Even only.

From the Sheet Order or Page Order drop-down menu, choose Normal (for bottom-loading input trays) or Automatic (for top-loading input trays).
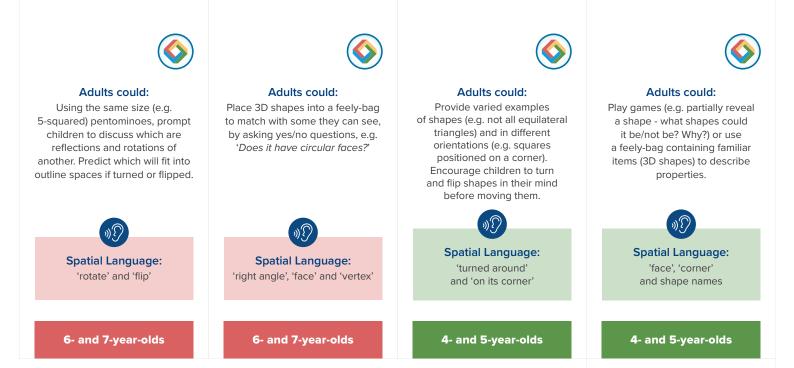
10. Click Print to complete the two-sided print job.

To change back to one-sided printing, reopen the print settings and remove the selections for two-sided printing.

Once printed you can laminate the A4 pages and then use a guillotine or scissors to cut out each card. A hole punch can be used to create a hole at the top to connect them on a key ring. We hope you find these Spatial Reasoning Toolkit Keyrings helpful in your practice.

To provide feedback on the materials in the Toolkit please scan the QR code or visit www.earlymaths.org/spatial-reasoning

Adults could:

Using the same size (e.g. 5-squared) pentominoes, prompt children to discuss which are reflections and rotations of another. Predict which will fit into outline spaces if turned or flipped.

Spatial Language:
'rotate' and 'flip'

6- and 7-year-olds

Adults could:

Place 3D shapes into a feely-bag to match with some they can see, by asking yes/no questions, e.g. *'Does it have circular faces?'*

Spatial Language:
'right angle', 'face' and 'vertex'

6- and 7-year-olds

Adults could:

Provide varied examples of shapes (e.g. not all equilateral triangles) and in different orientations (e.g. squares positioned on a corner). Encourage children to turn and flip shapes in their mind before moving them.

Spatial Language:
'turned around' and 'on its corner'

4- and 5-year-olds

Adults could:

Play games (e.g. partially reveal a shape - what shapes could it be/not be? Why?) or use a feely-bag containing familiar items (3D shapes) to describe properties.

Spatial Language:
'face', 'corner' and shape names

4- and 5-year-olds

For more ideas and information please scan the QR code below to visit the Spatial Reasoning Toolkit

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